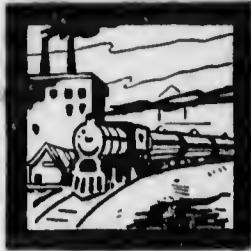


# The Oil World.

An Independent Weekly

Devoted to Oil Industry



Vol. 23.

LEXINGTON, KY., NOVEMBER 2, 1918.

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## EXEMPTION PLAN FOR OIL INDUSTRY IS GIVEN OUT BY OIL DIVISION

Geologists Not Included in List Entitled to Deferred Classification, Ruling Says.

## PRODUCTION ENGINEERS NOT REGARDED ESSENTIAL

Case of Each Individual Must Be Investigated, Oil Administrator Says.

WASHINGTON, Nov. 1.—Geologists and production engineers are not included in the list of those essential to the oil industry for war needs for whom Mark L. Requa, the Federal Oil Administrator, has asked the Department of Labor to have its industrial advisers exercise special care as regards exemption or deferred classification.

Director Requa's opinion is that the term "geologist" would include many not entitled to exemption or deferred classification of industrial reservation on account of their particular fitness and indispensableness in the oil industry. There are individual geologists, many of them, perhaps, and production engineers, too, who must be retained in the service to get an adequate supply of petroleum products. Their cases are being considered individually, and if their employing concern can prove that they are indispensable or essential to the successful and efficient operation of the producing property they will be exempt.

This opinion of Director Requa's was expressed in a reply to a joint letter by George Otis Smith, director of the Geological Survey, and Dr. Var. H. Manning, director of the United States Bureau of Mines, calling Mr. Requa's attention to the fact that he had omitted the geologist and production engineer from the list he supplied to the Labor Department enumerating the classes of industrial workers whose retention is necessary to the oil and natural gas industry.

### Mr. Requa's Letter.

October 3, 1918.

Mr. J. B. Densmore, Director-General, United States Employment Service, Department of Labor, Washington, D. C.:

Dear Sir—The war program demands of the oil and natural gas industries of the United States a constantly increasing amount of crude oil and its refined products and natural gas. The war cannot be won without the products of petroleum, and oil and natural gas are so necessary in the prosecution of the war that any curtailment of the present production would vitally affect the national welfare. The oil and natural gas industries have so far been equal to all demands made upon them, but the oil division of the Fuel Administration looks with apprehension upon the constantly decreasing supply of trained and experienced laborers in these two necessary industries. These industries have already furnished a great number of men to the military and naval forces, but it is inevitable, under the operations of the recent amendment to the selective service law, that there will be a further diminution of the necessary laborers in these industries.

Under the revised selective service regulations provision is made for the appointment by each district board of three persons, to be known as industrial advisers, to the district board—one to be nominated by the Department of Labor, one by the Department of Agriculture and one by the district board. The regulations provide that these advisers shall not, in any sense, be members of the district board, but shall have the right to furnish all pertinent information to the board, and may attend meetings of the board upon the request of the board to which they are attached, and may place before the district board all facts and information in their possession for the purpose of assisting the board in dealing with specific cases.

The oil division of the Fuel Administration most earnestly requests of the Department of Labor that there be impressed upon the advisers to the district boards, nominated by the Department of Labor, the vital necessity for maintaining the present production of crude

(Continued on Page Three.)

## PETROLEUM TAX SCHEDULE CHANGE

State Finance Committee Amends Revenue Bill to Allow Reductions.

WASHINGTON, Nov. 1.—The Senate Finance Committee, after hearing the pleas of the oil operators and of Mark L. Requa, head of the Oil Division of the Fuel Administration, have adopted amendments to the war revenue bill which allow the oil producers more liberal deductions in the case of taxes.

Senator Gore, of Oklahoma, a member of the Finance Committee, took a leading part in the discussion and strongly urged that the bill be liberalized for the oil men.

An amendment was adopted allowing for depreciation, as follows:

In the case of mines, oil and gas wells, other natural deposits, and timber, a reasonable allowance for depletion and depreciation of improvements, according to the peculiar conditions in each case, based upon cost, including cost of development not otherwise deducted; provided, that in the case of such properties acquired prior to March 1, 1913, the fair market value of the property (or the taxpayer's interest therein) on that date shall be taken in lieu of cost; and provided further, that in the case of mines, oil and gas wells, discovered by the taxpayer and not acquired as the result of purchase of a proven tract or lease, where the fair market value of the property is materially disproportionate to the cost, the depletion allowance shall be based upon the fair market value of the property at the date of the discovery, or within 12 months thereafter, such reasonable allowance in all the above cases to be made under rules and regulations to be prescribed by the commissioner with the approval of the secretary. In the case of leases the deductions allowed by this paragraph shall be equitably apportioned between the lessor and lessee. In the case of a foreign corporation, the deductions under this paragraph shall be allowed only as to property within the United States.

The committee also inserted the following provision in the bill, at the end of the list of surtaxes in the income tax section:

"In the case of a bona-fide sale of mines, oil or gas wells, or any interest therein, when the material value of the property has been demonstrated by prospecting exploration, or development work done by the taxpayer, the portion of the tax imposed by this title attributable to such sale shall not exceed 20 per cent. of the selling price of such property or interest."

## KENTUCKY FIELDS HARD HIT BY SPANISH FLU

Although operations in the Eastern Kentucky fields have not been menaced by the influenza epidemic as much as in other high grade fields, the result can be plainly noted from a trip through the productive districts in Estill, Lee and Wolfe counties, where the epidemic is raging. Several of the largest companies in the Kentucky field have practically suspended operations, owing to the lack of labor, the epidemic having reached such a stage that drillers refuse to go into the field, unless physicians can be had on short notice. As a result, the number of completed wells reported from these districts last week was smaller than it has been during any week since work was resumed on a large scale in the spring.

While the epidemic has caused severe suffering in Irvine and Beattyville, the rural districts of Lee and Estill were perhaps hit harder than the towns, owing to the fact that there are few rural doctors in those sections. As a rule, companies operating in Lee, Estill and Wolfe counties, depend, to a certain extent, upon the natives of those counties for labor, and due to the epidemic, skilled labor, brought from other states is practically all that is available, and under these conditions, most companies are operating only one shift, where they are operating at all.

## PRODUCTION INCREASE GENERALLY REPORTED

Big Wells in Louisiana—Kentucky Leads All Eastern Fields.

NEW YORK, Nov. 1.—The consensus of field reports from the various petroleum production centers of the country points to increased output, although as a rule the number of completions has declined. The Gulf Coastal fields of Texas and Louisiana, as well as the Panhandle fields of the Lone Star State, have been hard hit by influenza, with the result that there is even a more pronounced scarcity of labor than has been the case of late. It is reported that so great was the desire to escape influenza that in one day the number of outgoing tickets sold at the railroad station at Ranger was 1,100.

The shift in gasoline consumption regulation and production distribution by allocation at the refinery has not tended to weaken market conditions generally, for in the last result the domestic consumer is slated to get the worst end of the program. Government and Allied demands will come first, and then the consumer will get a chance at the balance.

### From the Fields.

The shift in output of crude in the fields is indicated by the reports from the Texas Panhandle and from the high-grade fields of the East. In the Panhandle the total completions for the period numbered 30, as compared with 46 for the previous week, and yet the amount of new oil produced totaled 11,145 barrels for the period just ended, as compared with 5,824 barrels for the week before. Burkburnett had 11 completions, with a total of 1,120 barrels, while Eastland county came through with but four completions, one of which was dry, with a production of new oil amounting to 5,000 barrels.

Many new refineries are being constructed in the Panhandle, with additional railroad and pipeline facilities and with the prospects for increased amounts of oil through the location of new pools; leases have climbed rapidly although the situation in regard to labor has been affected temporarily by the influenza epidemic.

### Eastern Fields.

The high-grade fields of the Eastern section of the country the week's report shows an increase in new production as well as an increase in the number of completions. During the interval there were 133 completions, with 4,120 barrels of new output, as against 124 completions and 3,024 barrels for the previous week. Kentucky leads the list with 65 completions, three of which were gasers and five dry, while the new-oil output from the Dark and Bloody Ground was 3,482 barrels. The great difficulty experienced in Kentucky is to move the oil after it is found, as pipeline facilities are lacking from important producing points. The Kentucky-Tennessee field developments now under way are the principal topic of interest, although it is too early yet to draw deductions as to what may be expected. All signs, however, point to a parallel development to that in Kentucky.

There were but six wells finished in Pennsylvania during the interval, but West Virginia added 29 wells to the completion list, 13 gas wells and four dry. The increase noted in production, however, was less than 100 barrels.

### Gulf Coast.

Field conditions in the Coastal fields have been influenced greatly by the inroads of influenza among the workers. It is reported that in consequence of the epidemic not more than one-fifth of the drilling rigs are in operation. Wildcat work has been the hardest hit, and there is almost no prospecting in new territory at the present writing. The best news of the week from the coastal territory was the completion of a 7,000-barrel producer in the old Vinton field. A well of 700 barrels is also reported in the Hull district, but elsewhere the report is not particularly encouraging.

### Mid-Continent.

Okmulgee county and the Garber pool are about the only interesting spots in the Mid-Continent at the present writing, with many wells shut down

## M'COMBS BUYS MORE PRODUCTION IN LEE

Louisville Company Has Five Rigs at Work on New Purchase.

Announcement was made in Lexington yesterday of the purchase of the Della Harris and Butcher tracts in Lee county by the McCombs Producing and Refining Company, of Louisville, for a price said to have been in the neighborhood of \$250,000. The deal involved only a three-fourths interest in the acreage.

The leases purchased consist of 116 acres and are regarded as very valuable property. There are now two wells, one of which under actual test for eighteen hours produced 292 barrels of oil and on Thursday No. 3 on the property was completed.

The McCombs Oil Company now have three rigs on this property and will move two more to it next week, according to announcement of officials of the purchasing company.

The Local Oil & Gas Company, of Winchester, holds the other one-fourth interest.

because of the epidemic. The best well of the week in the Okmulgee section was one of 2,000 barrels or more. There was the usual number of smaller completions, particularly in the Osage, while wildcat tests in Oklahoma gave little encouragement.

### North Louisiana

One of the best wells ever completed in the Pine Island district of North Louisiana was brought in last week with a settled production of 5,000 barrels a day. It is half-way between the Old Settlers' extension and the original Pine Island pool. Another well, which came in at 100 barrels a day and was increased to 100 barrels an hour, was another feature of this section of the Coastal fields. The record for the week is nine completions and 8,010 barrels of new oil. Eight of the completions and 7,995 barrels of new output are credited to the Caddo district, and one completion of fifteen barrels to the Soto.

### Wyoming.

The best news from Wyoming, which is beginning to anticipate the winter weather embargo, is the opening of a new field about 35 miles northeast of Rawlins and about 15 miles to the east of the Lost Soldier field. This may prove to be an important development. The oil is of high grade and the showing from the new well indicates fairly large quantities, as the well put 70 barrels into the tanks in the first 15 minutes after completion. The well is rated now at 500 barrels a day, while the oil is a paraffine base, 42-gravity product, or better than the oil from the well-known Salt Creek field. The Lusk field, brought into prominence by the bringing in of the recent gusher, seems to be another extremely important development, even though the well is located at least 25 miles from any railroad station. Surveyors are now reported at work on the preliminary steps toward the construction of a pipeline from the well to the railroad, and leases near by are bringing almost fabulous prices. The well, partially shut in because of lack of tankage and transportation facilities, is making 1,200 barrels a day. Another gusher, this time in Carbon county, is rated at 600 barrels. The big well in the Salt Creek field is holding to 4,500 barrels a day.

### Refined Products.

All else in the market for refined products is overshadowed by the gasoline situation. The domestic demand at once following the return to Sunday consumption showed an increase. Although just what further action will be taken by the Fuel Administration is yet a problem, there must of necessity be a feeling of uncertainty until the stocks figures for the month are completed. It is safe to assume, however, that no reckless use or waste of this valuable motor spirit will be permitted, even if a positive order is issued rather than another "suggestion." The overseas demand still continues at high point. There was no change of importance in other markets, certain lubricating grade prices being evened

## THREE-INCH PIPE LINE TO ROSS CREEK COMPLETE

Gives Outlet to Much More Oil in Estill County—No Independent Lines.

Announcement has been made that connections completing the 3-inch line of the Cumberland Pipe Line Company into the Ross Creek section of Estill county have been made. This will give an outlet to considerable storage oil, the 2-inch line, which has been taking the oil from that district, being inadequate to carry out all of the oil produced. As a result there has been considerable complaint from operators in that section, and an independent pipe line was considered. The additional facilities of the Cumberland, however, to handle the oil will prevent any such steps from being necessary.

## BONANZA OIL COMPANY BUYS LEE COUNTY TRACT

Handsome Figure Said to Have Been Paid for Section of Pendergrass Farm.

Definite announcement was made in Lexington during the week of the purchase of approximately thirty-five acres of the D. B. Pendergrass farm by the Bonanza Oil Company, of Winchester. The price was not made public but is known to have been a handsome figure. The tract purchased lies south of the Noland lease and north of the Jefferson tract, owned by the Lee County Land Company. On the east is the Dave Hampton farm of the Peerless Oil Company.

A rig is being moved to the purchase and drilling will begin immediately.

## JOHN W. HARDING AND E. HENSHAW BUY INTEREST

Interest of L. V. Mullen in Local Oil and Gas Company of Winchester Sold.

Announcement has been made in Lexington of a deal whereby L. V. Mullen, one of the best known oil operators in the Kentucky fields, disposes of his interest in the Local Oil and Gas Company, of Winchester, to John W. Harding and E. Henshaw, both of that place. The consideration was not made public, although it is understood that a good figure was paid, Mr. Mullen having held the controlling interest in the company, which is one of the most progressive local companies in the field.

Mr. Mullen controls other oil acreage in the Kentucky fields, and will in the future, direct his interests from Lexington, having moved his family here.

## MILLION BARRELS OF GASOLINE SAVED

WASHINGTON, Nov. 1.—More than a million barrels of gasoline have been presented to the military forces by the American people. This handsome and patriotic gift, which has already had a powerful effect towards winning the war, resulted from the strict observation of gasolineless Sundays by the public.

The request of the United States Fuel Administration to automobile owners in all the States east of the Mississippi River to discontinue Sunday driving until a reserve supply of gasoline could be built up effected a saving of more than 1,000,000 barrels for war purposes.

The request to save gasoline was issued on September 1 and withdrawn on October 17. Thus, in a period covering seven Sundays, there was an average saving of about 143,000 barrels for each Sunday. While the request for further saving at this time is withdrawn, it is pointed out by the Fuel Administration that if at the end of two weeks stocks are found to be dangerously low it may be necessary to again ask the public to put the voluntary plan into effect.

## INFLUENZA, WEATHER AND MUDDY ROADS ARE DETRIMENTAL TO WORK

Operations in Irvine Field Are Held Up to Some Extent As Result.

## FEW BIG WELLS ARE REPORTED COMPLETE

Hudson and Collins Get Big Well At No. 8 Preston Sloan—Field News.

Weather conditions, muddy roads and influenza are causing operations in the Irvine fields to be held up to some extent, and the number of completions during the past week have fallen off. The best well reported in was that of Hudson & Collins, this being No. 8 Preston Sloan, and according to Frank Hudson is good for 200 barrels or better. This well is in Lee county.

### Estill County.

In Estill county the Arvin Oil Company's No. 5 Arvin heirs is credited with fifteen barrels.

The Comet Oil Company's No. 21 Jeff Harris is credited with thirty five barrels or better.

The Station Camp Oil Company, drilling on the James A. Wallace farm, got a 20-barrel well.

The Old Dominion Oil Company scored a 10-barrel well at No. 5 J. F. Harris. No. 6 is drilling.

West & Edwards got a duster at their initial test on the James Gabbard farm.

In the Woodward's Fork section, the Wood Oil Company got two five-barrel wells at Nos. 7 and 8 W. G. McCoy.

L. G. Neely, drilling at No. 7, Charles Means, has also completed a five-barrel well.

### Lee County.

In Lee county, the Ohio Oil Company got a dry hole at No. 1, on the Logue tract, ahead of the production on Billy's Fork of Miller's Creek. The well was drilled to second pay, where salt water was encountered. The Ohio Oil Company is also drilling Nos. 9 and 10 on the Flahaven Land Company tract. No. 16 was recently completed, but has been pumped.

The Eureka Oil and Mineral Company is drilling No. 3, Doc Smith.

The Atlantic Oil Producing Company has completed No. 2, Bruce Kincaid, west of Airdale, but a definite report is lacking.

The Traman Oil Company, drilling on the Anna Fisher tract, in the vicinity of the property of the Flahaven Land Company have a well credited with 30 barrels or better.

On the Moore farm, the Seaboard Oil Company, of Norfolk, Va., has completed No. 2, and report it as a 75-barrel producer. No. 3 is due in, and preparations are being made to drill No. 4.

The Wright Oil Company is at work on No. 1 on the Spring Hollow property on Bald Rock Fork. The same company is drilling No. 2 John A. Curry, between Big and Little Sinkings.

### Wolfe County.

In Wolfe County, the Combination Company will soon sink a test on the Graham lease.

D. N. Baker and others are preparing to drill No. 1 A. C. Creech.

### Lincoln County.

The following wells have been reported completed in Lincoln county since drilling first started over a year ago:

Daniel Boone Oil Co. No. 1 Joseph Wieland, gas; No. 2, one barrel; No. 3 dry; No. 4, pumps 5 bbls.; No. 6 pumps 20 bbls.; No. 7, pumps 20 bbls.; No. 8, 3 bbls.; No. 9, pumps 5 bbls.; No. 10, dry; No. 11, pumps 2 bbls.; No. 12, pumps 15 bbls.; No. 13, pumps 10 bbls.; No. 14, pumps 25 bbls.; No. 15, pumps 5 bbls.; No. 16, pumps 20 bbls.; No. 18, pumps 5 bbls.; and No. 19, pumps 3 bbls.; with Nos. 17 and 20 drilling.

Same company No. 1 J. R. Morrell farm was dry, as was No. 4, while Nos. 2 and 3 pumped 10 and 3 bbls., with No. 5 drilling.

The Daniel Boone Oil Co.'s Nos. 1, 3, 4, 5, 6 and 9 A. Schuler farm, in the Buck Creek district, were gas wells.

(Continued on Page Three)

## Water A Serious Problem Confronting The Kentucky Operator; Methods of Overcoming

(EDITOR'S NOTE: This story and accompanying illustrations are reproduced from the Lexington Herald of Sunday.)

By JOHN GOURLEY.

The present great conflict in Europe has served to tell the world the value of petroleum and its products and he who wastes this most wonderful of all the natural resources is as big an enemy to the public good as the German submarine commander who sinks an oil tanker on the high seas. Careless operating in the oil fields is the greatest source of waste or loss to the oil industry and in this, one of the newest oil fields the time is ripe for a campaign of education of who who do not know and for the exercise of the greatest care by the operators whose experience has taught them the dangers to be encountered.

There are now in Kentucky many progressive business men who have realized in a way the fortunes in oil which underlie the mountains in their state and who are dividing their time and their energies between their affairs in the Bluegrass and their new interests in the oil fields, but inexperienced as they are in the new work they often do things which they ought not to do and leave undone many things which they should do. Their responsibility as oil men demands that they should not merely be satisfied with taking what they can wrest from nature but that they should take it carefully always keeping in mind that certain natural laws are at work and that great damage can be done by neglecting them.

Water, by reason of its greater specific gravity displaces oil and gas and consequently if an oil sand has no water in it, the greatest care should be taken to prevent the water reaching it. The water may be above the oil sand and separated from the oil sand by a thick or thin strata of impervious material, such as clay or slate or it may be immediately above the sand and separated by only a few inches, or it may be below the oil sand at a greater or less distance, but in nine cases out of ten by carefully studying the problem, it can be kept out of the oil strata and not only save the production of the particular well but also the whole field. The speed with which water travels in an oil sand is sometimes amazing, although it is generally controlled by the nature of the sand and

the gravity of the oil.

The encroachment of water is generally slow in its first stage, a trace being noticed first and gradually increasing until the operator is face to face with the fact that his well is making more water than oil. A whole lease or portion of a field may therefore be affected before steps are taken to correct it and the longer the encroachment is allowed to continue the greater the problem is to stop it.

In a group of wells the trouble may

originate from one well and if the source of the water is located it is usually an easy matter to stop it, but the locating of the source is always rendered difficult by each operator claiming his well is not to blame.

Kentucky, although in some respects a new oil producing state, is particularly bad in this respect, and numerous instances can be quoted where inattention to the important work of plugging off water has ruined sections which might still be important producing fields, and

the worst result of the negligence is that the parties at fault not only lose their own property by their carelessness but also ruin that of their neighbors who may be excellent and careful operators.

The encroachment of water on the oil bearing sands is unquestionably the most important problem connected with the industry and has received very careful consideration and attention in other fields, particularly in California but not in them until great damage had been done.

The production from all oil wells gradually declines so that if a well is producing five per cent water when it comes in and is making 20 per cent when the well is six months old, the actual amount of water may not have increased and there is very little reason for alarm, but if a well makes no water until it has been pumped for six months and then begins to show a trace which continues to increase from day to day, careful attention should be given to the well, the source of the water discovered and if possible a remedy applied. In every field therefore, the individual operator should make frequent examinations of the oil produced from his wells or a number of them in one district should join in keeping a man to make daily tests of the oil from all the wells and tabulate the results. In this way the well which is at fault can be located and steps taken to correct the trouble.

The method of testing the oil for water is very simple and the apparatus is shown in the sketch (fig. 1). The oil is collected in a small can as it leaves the lead line at the well and placed in the graduated glass which usually contains 100 cubic centimeters. The glass is placed in the centrifugal machine and revolved at a high speed for five minutes when the centrifugal force causes all the water in the oil to go to the bottom of the glass. At a very slight expense, therefore, the individual wells in a group or district can be tested daily and either the daily, average monthly results plotted on a chart as in fig. 2, from which at a glance the condition of the well can be ascertained.

After a period of such testing and examination if it is discovered that the

wells in a certain group are increasing in the percentage of water the tabulated results will probably indicate certain wells which might be blamed for the trouble. Before corrective steps can be taken definite information must be obtained first from which well the water is coming and then from what point in the well.

In Fig. 3 is shown a group of wells owned by six different companies. Tabulated results have shown that the water has been allowed to enter the oil sands and well No. 3 of "C Oil Co." is suspected of causing the trouble. An examination of the drilling record of this well shows that it has been drilled into a water strata below the oil sand from which it and the other wells of the group are producing. The owner of "C Oil Co." however refuses to believe that the water from his well can affect the others, but is willing to be convinced. Arrangements are therefore made to pull the tubing out of well No. 3 and about ten pounds of intense aniline dye is mixed into three or four barrels of water and allowed to run into the well. The colored water is carried through the oil to the bottom of the whole and if the water from the well is spreading into the oil bearing strata the colored water is carried with it. Hourly tests are made of the oil and water pumped from the neighboring wells and the tests are continued for a number of days until the colored water has been discovered in a sample collected from another well, or until sufficient time has been allowed to pass to convince the members of the group that the suspected well was not to blame. The aniline dye method is

very satisfactory and the results obtained are sometimes extraordinary, a case having been noted in California where ten pounds of dye mixed with about ten barrels of water passed through the oil bearing formations and was sampled in another well about one hundred feet distant in three hours and fifteen minutes. This method is used to ascertain if the water from one well is spreading to others in a group, but it can also be used to learn if the water from behind a string of casing has broken into the oil in the same well, the method employed in the latter case being to put the aniline dye down around the casing with which the top water has been shut off and carefully watch the water pumped with the oil from the well. The source of the water having been thus ascertained, the remainder is simply the mechanical work of shutting the water off.

The following communications show what is being done in other fields to solve the problem:

Mr. John Gourley, Petroleum Midway Company, Lt., Lexington, Ky.

My Dear Mr. Gourley.—Your letter of October 6 to Mr. Naramore has been received and I am answering it in his absence. He has not yet returned from England.

I note what you say in regard to the water situation in Kentucky and feel as you do that some step should be taken to meet the situation. The best way to effect conservation is by preventative measures rather than by remedial measures. It is much easier to prevent the

(Continued on Page Four)

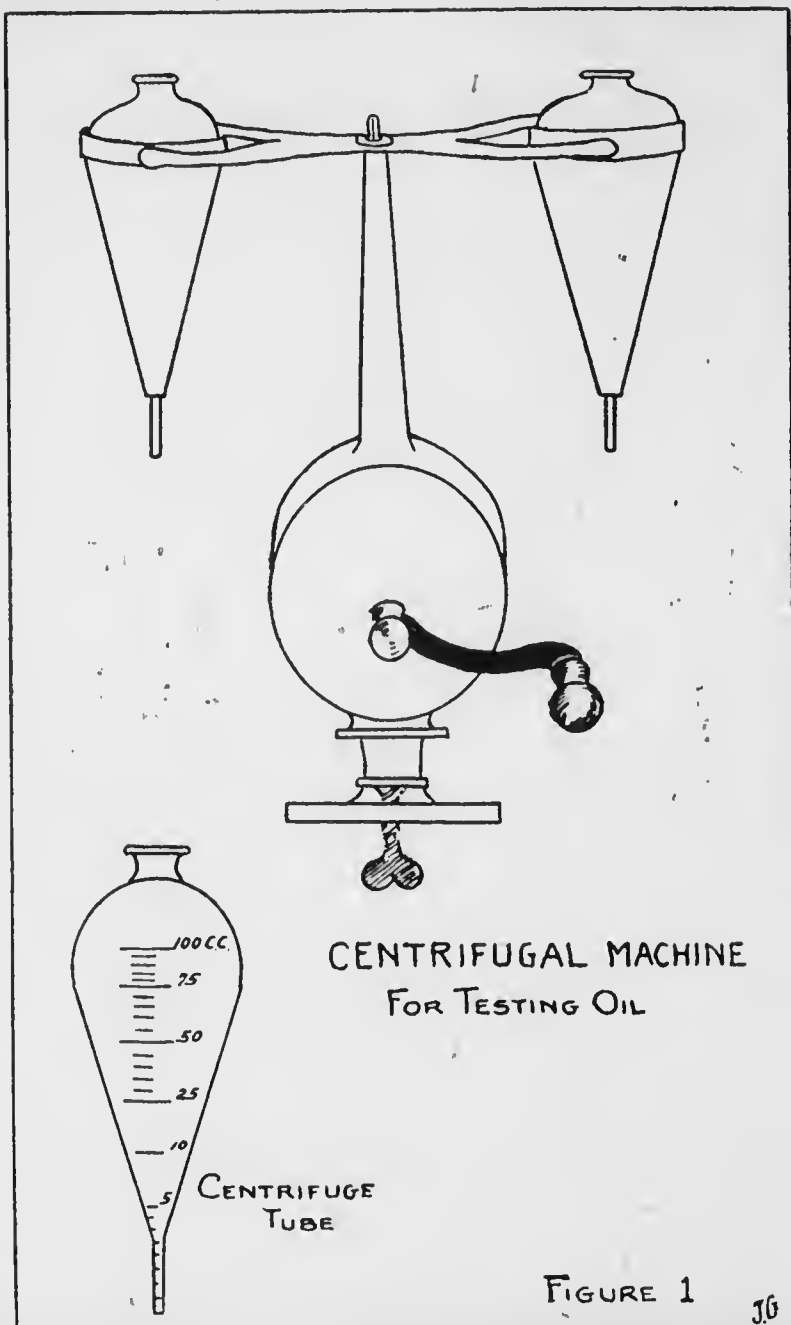


FIGURE 1

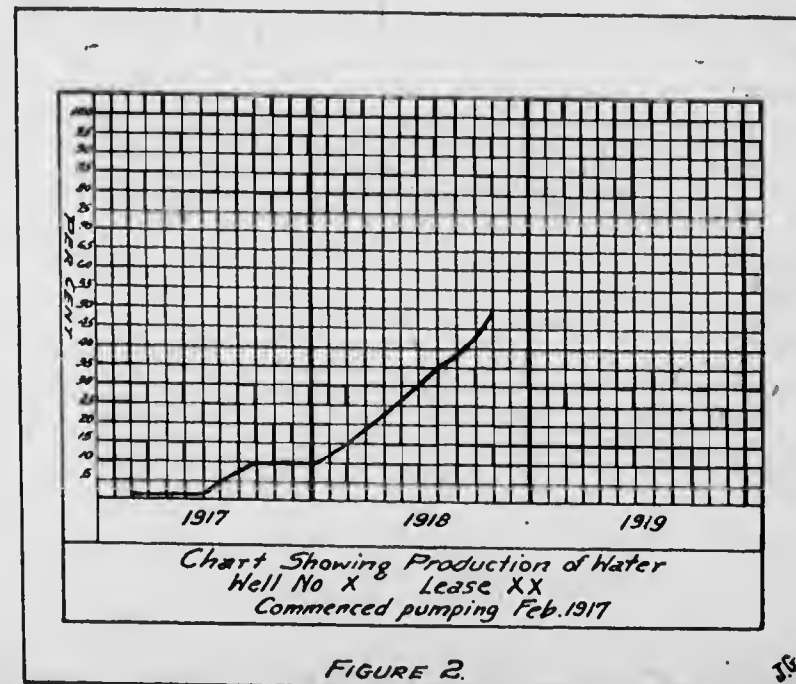


FIGURE 2.

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17,000 Acres of Leases

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#### "McCombs" Acquires Big Sinking Lease

We have just purchased a three-quarter undivided interest in the R. Butcher and Della Hargis leases in the heart of the Big Sinking District in Lee County. On this tract, three wells have been drilled in. No. 1 made 292 barrels in eighteen hours on actual test. Three rigs now on property; two more moving on.

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Mineralogist and Geology of

Petroleum

Reports on Oil Lands and Developments  
Local Address, Lexington, Ky. Box 12

**DIRECTORY RATES UPON**

APPLICATION.

by people who should be in a position  
to know whereof they speak.

During the week, fifteen completions  
were reported, and two dry holes.  
Estill County reported six completions,  
ranging from 5 to 100 barrels; Jack-  
son County came in with two wells,  
good for 10 and 40 barrels, respec-  
tively; Lee County reported seven com-  
pletions, good for from 25 to 200 bar-  
rels.

Pipe line runs for the week were  
93,751.09 barrels, an increase of 5,232.74  
barrels over last week.

**KENTUCKY OIL LIST.**

(Furnished by Kentucky Oil Exchange,  
Inc., Phoenix Hotel Building,  
Lexington, Ky.)

November 2, 1918.

	Last Bid.	Last Asked.
A-One .....	1.00	
Alakyla .....	1.00	
Arrowhead .....	1.00	
Big Bird Oil & Gas .....	10.00	
Banner .....	.50	
Bonanza .....	1.25	
Blue Ridge .....	.50	
Barnett .....	.18	.25
Bankers Oil .....	1.10	1.50
Big Four .....	6.00	
Bourbon Oil and Dev. ....	.95	
Barrick Kentucky .....	.65	
Cherokee .....	.50	.55
Colonial .....	250.00	
Comet .....	1.00	1.10
Co-Operators .....	1.25	
Cosden .....	7.15	7.35
Crown .....	.15	.25
Cumberland P. & R. ....	.16	.25
Day Oil .....	1.00	
Daw .....	1.00	
Erie .....	6.50	
Farmers Oil .....	1.50	
Federal .....	2.00	2.15
George Washington .....	.40	
Gordon O. and G. ....	8.50	
Henry Clay .....	.50	
Hecla .....	.75	
High Gravity .....	.18	.22
Himyar .....	1.00	
Hopewell Petroleum .....	150.00	
Hoffman .....	3.00	5.00
Ky. Nat. Pet. ....	10.00	
Ky. Colonels .....	1.25	
Local Oil & Gas .....	1.40	
Louisville O. & G. ....	1.00	
Long Creek Oil & Gas ..	25.00	
Lincoln .....	.90	
May Day .....	.70	
Mason & Dixon .....	1.00	
McCombs .....	2.00	
Monarch V. Pet. ....	1.00	
Montezuma .....	1.00	
Oleum Refining .....	6.00	
Old Dominion .....	115.00	
Pan American .....	1.00	
Penn Kentucky .....	5.00	5.50
Planet, with lots .....	1.00	
Pyramid .....	1.35	
Peerless Oil .....	4.75	
Petroleum Exploration ..	30.00	
Puritan .....	.70	.75
Quaker .....	.50	
Republic .....	.20	
Rex Oil .....	100.00	
Security P. & R. ....	1.00	
Southern Oil of Lee .....	225.00	
Station Camp .....	1.50	
Snodden O. & G. ....	25.00	
Stanton .....	1.60	1.75
Sturgis .....	1.25	
Studebaker .....	1.00	
Sturgeon Creek .....	1.00	
Trinity .....	1.85	
Thraman .....	1.00	
Wyoming-Kentucky .....	.50	
W. P. Williams .....	1.35	

**EXEMPTION PLAN FOR OIL  
INDUSTRY IS GIVEN**

(Continued from Page One)

oil and its refined products and of nat-  
ural gas, and, with this end in view, to  
retain in the employ of these industries  
trained and technical men who are  
necessary thereto.

The classes of industrial workers  
whose retention is vitally necessary to  
the oil and natural gas industries in-  
clude:

**PRODUCTION.**

General superintendents.  
Field or division superintendents and  
assistants.  
Foremen (all branches of field work)  
Drilling tool superintendents.  
Pumpers.  
Expert connection men.  
Stationary engineers (includes gaso-  
line station engineers).  
Drillers.  
Skilled machinists.  
Rig builders.  
Gaugers.

TRANSPORTATION OF CRUDE  
PETROLEUM AND NATURAL  
GAS BY PIPELINES, INCLUD-  
ING GATHERING LINES,  
TRUNK LINES AND DISTRI-  
BUTING LINES.  
Superintendents.  
Chief oil dispatchers.  
Superintendents of telegraph.  
Telegraph line repairmen.  
Pipeline machinists and pipe fitters.

**PUMP AND COMPRESSING  
STATIONS.**

Foremen engineers.  
Engineers.  
Gaugers.

**DISTRIBUTION AND MARKET-  
ING OF OIL AND NATURAL  
GAS.**

Plant superintendents.  
MANUFACTURING DEPART-  
MENT.

Superintendents.  
Stationary engineers.  
Stillmen.  
Oil treaters.  
Oil testers.  
Furnacemen.  
Burnermen.  
Special pipe fitters.  
Gaugers.  
Still inspectors.  
Engineers of gasoline compressing  
stations.  
Chemists.

**MARINE TRANSPORTATION OF  
PETROLEUM AND ITS  
PRODUCTS.**

Captains and crews of tankers.  
Captains and crews of tugs and  
barges.

This classification is intended to cover  
only the different classes of skilled  
labor in the oil and natural gas indus-  
tries. There will, of course, be other  
cases of executive officers who may be  
entitled to deferred classification under  
the selective service regulations.

The oil and natural gas industries  
have been urged to impress upon dis-  
trict boards the desirability of claiming  
deferred classification for a registrant  
whenever he is a man whose employ-  
ment may fairly be considered as a  
necessary employment within the mean-  
ing of the selective service regulations,  
and I have earnestly to request your  
department to instruct the industrial  
advisers to the district boards to be  
nominated by the Department of Labor  
to give due consideration to the re-  
quirements of the oil and natural gas  
industries in rendering advice or assist-  
ance to the district boards.

Very truly yours,  
(Signed) M. L. REQUA,  
General Director, Oil Division.

**INFLUENZA, WEATHER  
AND MUDDY ROADS ARE**

(Continued from Page One.)

and Nos. 2, 7 and 8, same farm, were  
dry holes. This company also drilled  
a dry hole on the Weintjes farm and  
one on the E. Heuzen farm, in the Ot-  
tenheim district.

The Belvedere Oil Co.'s Nos. 2, 3,  
4, 5, 6 and 7 William Earnst farm  
pump 8, 5, 10, 20 and 3 barrels, re-  
spectively. No. 1 pumped only one bar-  
rel and was abandoned, while No. 8 is  
drilling.

S. L. Newton's Nos. 1, 2, and 3 Ben  
Bussee farm pump 2, 6 and 12 bbls.

The Florence Oil Co.'s No. 1 M.  
Warren farm is a gas well, and No. 2 is  
drilling.

The Florida-Kentucky Oil Co.'s No.  
1, Cook farm, pumps 10 bbls. and No.  
1 is a gas well, with No. 3 drilling.

The Wyoming-Kentucky Oil Co.'s  
Nos. 1 and 2 Ben Bussee farm, pump  
5 and 8 barrels.

The Fisher Oil Co.'s well on the T.  
D. Lay farm is a gas well, and No. 1  
M. Mitchell farm, is drilling.

The Wood Oil Co. drilled dry holes  
on the J. Hall, James Dye and Charles  
Jacobs farms and Burwald and others  
are drilling a well along Green river.

**Adair County.**

In Adair

## THE OIL WORLD

An Independent Weekly Newspaper Devoted to the Oil and Gas Industry of Kentucky. A Medium for Both Operators and Investors.

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**OIL PUBLISHING COMPANY**  
(Incorporated)  
Skala Building Lexington, Ky.  
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F. F. Thompson.....Editor and Manager  
Thos. M. Owsley.....Act. Sec'y and Treas.

Entered as second-class mail matter February 15, 1918, at the postoffice at Lexington, Ky., under the Act of March 3, 1879.

**SUBSCRIPTION RATES**  
1 year.....\$3.00  
6 Months.....2.00  
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Vol. 2. SATURDAY, NOV. 2, 1918. No. 23

## THE CALL TO ARMS

New York Stock Exchange firms have given 25 per cent of their normal male personnel to military service as volunteers, and 9 per cent as draftees, and in addition have 17 per cent registered and awaiting call under the 21 to 31 draft. Thus more than half of the total normal number of men were either fighting Germany or were signed up for the fighting prior to the registration of September 12. As is the case in each of the groups canvassed, more of the men from the Stock Exchange group volunteered than were drafted. Seventy-four per cent of those in service from the group are volunteers, and 10 per cent of those volunteered are partners or other officials.

The response of the men of individual Stock Exchange firms to the call of war is fully as inspiring as that of the men from certain investment banking firms. Nineteen in service out of a total of 25 male employees, 6 in service out of 7, 30 out of 55, 3 partners and 4 employees volunteering out of a total personnel of 8, and similar extraordinary contributions of man power were fairly common in the Stock Exchange group.

New York's other indoor stock exchange, the Consolidated, rivals the Curb as a holder of first and second places. Proportionately more partners and officials from Consolidated Stock Exchange companies have volunteered, been drafted, and are registered and subject to call than were furnished by any other one of the financial groups canvassed by Dow, Jones & Co. Twenty-five per cent of all the men volunteering from Consolidated Stock Exchange firms are partners or other officials, or 2 per cent more than went from the investment banking group, which holds second place in regard to proportion of officials volunteering. Fifty per cent of the men drafted from the Consolidated group and 40 per cent of those awaiting call are executive officials, as compared with 3 per cent drafted from Coffee and Sugar Exchange firms, and 19 per cent registered and subject to call in the investment banking group, which occupy respectively, second place as regards proportion of officials drafted, and second place as regards proportion of officials registered and subject to call.

Thirty per cent of all the men normally employed by the Consolidated Stock Exchange group have volunteered, 7 per cent have been drafted, and 19 per cent are awaiting call—a total actual and potential contribution of 56 per cent of its personnel to military service.

With 80 per cent of the men it has in service gone as volunteers, the Consolidated group is within 3 per cent of equalling the record made by the investment banking companies, which lead all the financial groups in regard to preponderance of volunteers over draftees.

The bank-trust company group surpassed the Consolidated group in the proportion of total number of employees drafted. Eight per cent of the normal male personnel of the bank-trust company group have already been drafted, and 11 per cent are registered and subject to call, exclusive of those registered September 12.

Fifteen per cent of the total number of bank-trust company employees have volunteered, and of those volunteers 7 per cent are partners or other officials. Three per cent of those registered and subject to call, and 1 per cent of those drafted are also officials.

With 34 per cent of their normal number of employees either in service or soon to be in service, Wall Street's banks and trust companies are obviously hard hit by the war. The sacrifice they have made becomes all the more apparent when one considers the length of time necessary to instruct new men in the often complex and highly technical work devolving upon the bank employee or official. When a bank official or employee goes away to war, the machinery of the bank must slow up until the man who takes the vacant place attains some of the knowledge and the efficiency that his predecessor has perhaps taken years to acquire. When a great many men leave a bank for military service, as has happened in every bank canvassed, the bank may be seriously crippled, the nation's whole structure of financial credit may be impaired, commerce and industry may slow up—but the work of war-making itself has to and does go on uninteruptedly.—Wall Street Journal.

## WATER A SERIOUS PROBLEM, CONFRONTING

(Continued from Page Two)  
adoption of wasteful practices than it is to remedy conditions after such practices have been put into use, providing one is able to convince the operators that such preventative measures should be taken. Ordinarily, the operators feel that such work is needless and rarely become converts until after their fields have almost hopelessly been ruined.

I would like nothing better than to send one of the bureau's men thoroughly conversant with water problems into that district to work hand-in-hand with you, but at the present time it seems that we are so taken up with war problems and conservation in other fields that there is not a single man available. You perhaps have already read in the trade journals about the work we have carried on in Oklahoma and Kansas and it is desirable to extend this work to Kentucky, but cannot be done at the present time.

There is no question as to the necessity of carrying on the work you suggest. I heartily approve of such measures, but the adoption of a concerted policy or an organization of the producers into a protective association are things that are difficult to accomplish in a short time. In our bureau work we have found from experience that the best results are obtained by leading the operators rather than by driving them. My suggestion would be for you to make it a point to talk to the different operators, show them that they will profit ultimately by the adoption of more conservative methods and if possible awake the foremost operators in the vicinity to the necessity of organizing themselves into a protective association.

I take pleasure in enclosing you a copy of a letter received yesterday from J. O. Lewis, the superintendent of the Bureau of Mines Petroleum Station at Bartlesville, Okla. This letter gives in detail the method which Lewis adopted in organizing the Kansas operators to fight the water menace in the Augusta and El Dorado fields.

As stated above, our men are so taken up with other pressing work that it will be impossible at the present time to detail a man to the Kentucky problem, but I assure you if it is possible in the future for one of our technical men to spend a few days with you, I shall certainly have them do so. I wish to offer you all the assistance we possibly can afford you in this work. I think that some of the biggest ultimate savings can be made by the missionary work done by

just such men as you. Please do not hesitate to write me if I can be of any service.

Sincerely yours,

CARL H. BEAL,  
Acting Chief Petroleum Technologist,  
Mining Experiment Station, Bartlesville, Okla.

September 21, 1918.

The Director:

Through Acting Chief Petroleum Technologist.

Our meeting at Wichita went through in pretty good shape—much better, in fact, than I or any one else had hoped for. There was quite a good attendance, and nearly all of the important companies were represented, although only about a third of all the companies on my list responded to the roll call. The list, however, undoubtedly included a good many dead ones. I would say at least 95 per cent of the producing acreage was represented.

I opened the meeting with a little work of explanation of how the Bureau of Mines happened to be in it and what the purpose of the meeting was for. Hammer followed with some statements in regard to what had been done in Oklahoma towards shutting off water. Curtin followed Hammer with some statements on the Butler county fields and results there. Tough told them something of the results of shutting off water in Illinois, and told them what a geological engineer was and how he worked into the problems of shutting off water. I closed the case for the Bureau of Mines with a resume of conditions and urged them very strongly to get together. Our program took about an hour and 10 minutes.

After we got through I requested one of the operators, Mr. A. L. Derby, to act as temporary chairman. Mr. Derby then took charge of the meeting and called on various operators there to state their opinions. All were very hearty in favor of it. A roll call was then made and a vote taken on whether they should go ahead with the formation of an association, no dissenting votes being recorded.

A committee of 15 was then appointed to meet the next morning at 9 o'clock to formulate plans for the organization. Another committee was formed to notify companies not present to attend a second meeting to be held at 2 o'clock next day. The Bureau of Mines was requested to be present at both committee meetings. A vote of thanks was passed in recognition of the Bureau of Mines' work in this matter and much appreciation, both in the meeting and outside, was expressed towards the ef-

forts of the Bureau.

I attended the meeting of the committee the next morning and they outlined in the rough an association much along the lines that I had suggested the previous night, which was an association of all the producers of Butler county, with some equitable system of representation and of the distribution of expenses, this association to elect officers once a year and an executive committee consisting of superintendents or men in charge of production in the field. This executive committee was to act as a board of conciliation and also to supervise the actual field operations of the association. They were to select and supervise the work of a staff to be in charge of a practical man and a technical assistant, and as many more assistants as would be found necessary. The cost of this work was estimated to be about \$30,000 for the first year, and the view was expressed that the very best man possible should be put on the work. The actual remedial work should be done by the various companies, with their own men, but the staff should gather all information, supervise tests, etc., and advise what wells should be treated and how treated. There would be no mention of compulsion, and the association throughout would be a voluntary organization.

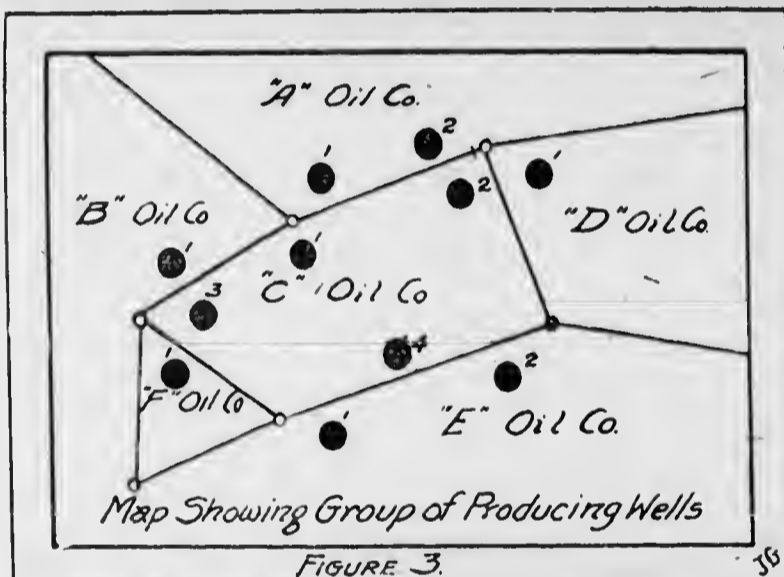
Some members of the committee wished the Bureau of Mines to take charge of this work, but I did not agree to this, giving as my reasons that I thought it would work out better from both their standpoint and the standpoint of the bureau if we did not have any obligations nor any authority, and that the Bureau of Mines would gladly advise as much as possible. The second objection that I had was that I was of the opinion that before very long all members of the bureau would be so taken up in special war work that I did not feel like making any promises for fear I could not fulfill them.

The committee made a report at the general meeting, which was passed without a dissenting vote, providing for

(Continued on Page Six)

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## Facts Concerning The Kentucky Oil Fields As Told By An Efficiency Oil Engineer

By WM. CLEMENT LEONARD.

The State of Kentucky is one of the States in which oil pools can be expected to be found in several different sections owing to the peculiar way in which the great earth disturbances have affected it. These disturbances have practically formed a great cross as they traverse the State and create conditions favorable for the accumulation of oil in many sections.

The disturbance which formed the "Cincinnati Arch" trended slightly northeast and southwest while the "Chestnut Ridge" disturbance ran practically east and west, crossing each other along the southern boundary of

the Blue Grass region. These disturbances practically divide the State into four quarters and in each of these quarters oil pools are probable.

There are few people, outside of the geologist, who understand the great influence which the Cincinnati Arch and the Chestnut Ridge disturbance have had on the accumulation of oil in Kentucky, and the writer will try to give these reasons in such plain terms that the layman will readily understand them.

### Geological Features.

The possibilities of several oil pools existing in Kentucky have been firmly established within the past few years by the finding of such oil pools as those at Campton, Irvine, Scottsville, Somerset, Monticello, Sulphur Well, Oil City, Petroleum and several other places. These pools have led to the critical examination of the geological reasons for the finding of oil in this section and a summary of these examinations will be briefly stated below. Extending in a large crescent shape from the direction of Chicago through the states of Indiana, Illinois, Ohio, Kentucky, Tennessee, is an enormous uplift which has been designated the Cincinnati Arch.

This great anticline was originally supposed to extend from Cincinnati to Toledo, but evidence afforded by enormous gas well in that region has proved that the Toledo fold is only a small branch of the principal uplift. In the lower part of Kentucky its trend is roughly N. 20 degrees E. The maximum development of this fold stratigraphically occurs in the vicinity of Lexington, Ky., where the Trenton limestone is exposed at an altitude of a thousand feet above sea level. This arch separates geologically, the Ohio drainage basin into two parts of structural basins, each of which contains coal bearing rocks. On the Eastern side of the "Cincinnati Arch" the basin is generally known as the Appalachian coal field and that on the western side is the Western Kentucky coal field. The rocks of the Ohio Basin have been disturbed by other small folds besides the main structural features and in places they have been broken by small faults.

In order to explain the technical understanding of the Cincinnati arch, as the geologist understands it, in a simple manner, so that the layman can readily grasp the idea, we will use the ocean as an illustration. Let us presume that a mountain range lies beneath the waters of the ocean and at one point the mountain is so high that a part of it rises out of the water in the nature of an island. Now let this island represent the rocks of Ordovician system of geology and we have here represented the enormous dome which rises on top of the Cincinnati Arch for a radius of about 40 miles around Lexington, Kentucky, where the Ordovician system is exposed over what is commonly known as the Blue Grass Region and dipping down from all sides of this dome underneath the later formations, as the island dips under the water, the Ordovician system buries itself. On the top of the supposed submerged mountain, or along the top of the Cincinnati Arch it is found at no point at a depth greater than a few hundred feet below the exposed surface.

If, for example, we were to measure the depth to the top of the submerged mountain under the ocean we would find it but a short distance below the surface of the water but if we go a few miles off one side or the other and measured the distance to the mountain below the water we would find it at a much greater depth than when we measured from directly over the top of the mountain. Now, let us suppose that we are going to drill a well until we reach the top of the Ordovician system in Kentucky. We would not have to drill at all within the radius of 40 miles around Lexington because it comes to the surface in this area but as we go in a 20 degrees southwest direction we travel

along the top of the arch like the top of the submerged mountain and the drilling here to reach the Ordovician will be very shallow across a belt of practically 100 miles wide and extending through the state into Tennessee. If we go either east or west from this arch and attempt to drill to the Ordovician we will have to drill deeper the farther east or west we go because in going east or west we are travelling toward the syncline or under-ground valley, lying on the sides of the arch; therefore, the drilling in eastern or western Kentucky will be very much deeper when looking for oil sands on the sides of the arch than it will be if done on or near the top of the Cincinnati Arch.

### Silurian System.

Lying immediately above the Ordovician system is the formations, where not eroded away, known as the Silurian System which has a depth in some places of nearly 900 feet and is composed chiefly of what is known as the High Bridge limestone, the Lexington limestone, the Winchester limestone, the Gerard sandstone and the Richmond shale.

### The First "Oil Sand"

Lying immediately above the Silurian is the Panola formation, classified by Campbell as the Siluro-Devonian strata, which consists usually of three members, the lowermost of which is a coarse, yellow rock which is often as much as 80 feet thick. The middle is a fine blue shale usually carrying thin beds of impure limestone in which are found fossils that have been identified as belonging to the Niagara species. The top member of this formation is a heavy bedded brown limestone which also forms the bottom stratum of the Devonian series and usually carries an abundance of Nodular Chert. This formation is the one usually known as the "Oil Sand," and which in many places acts as the reservoir for the oil supplied by the Devonian shale.

### Source of the Devonian.

Immediately above this formation lies the Devonian strata and the line of separation between the Panola formation and the black shale of the Devonian is sharp and distinct, except in a few cases where the change is accomplished by gradual inner bedding. The black shale referred to is known as the Chattanooga shale at some places and as the New Albany shale at other places, and its thickness ranges from 10 to 150 feet. South of the centre of Kentucky, on top of the Cincinnati Arch it rarely exceeds 100 feet in thickness and thins out to from ten to thirty feet in parts of Tennessee. It is well known for its bituminous character and is considered the source of the oil in Kentucky, inasmuch as it has been possible to recover as much as twenty gallons to the ton of oil from this shale by the process of distillation. When this formation was laid down, this district must have experienced many fluctuations of levels and conditions to account for many irregularities in thickness as it is today found. The Devonian sea which caused the formation of this series was evidently a very shallow one, abounding in both animal and vegetable life which died and decayed, their oil contents becoming imprisoned in the mass of mud and debris as it later became solidified. Throughout this section, wherever the Devonian shale is covered by later formations it is found to contain large percentages of oil. The writer has made tests by forcing different kinds of water through the shale and finds that when certain salt waters are forced through under pressure, that they release the oil much quicker and more thoroughly than other waters do, by cutting the oil from the shale much like gasoline cuts the grease from the hands. On this point, however, many theories are advanced, but the fact still remains that by some process the oil is released from the Devonian shale in this section and finds a lodgment in the porous limestone which acts as a reservoir.

When once released the oil together with the salt water which has cut it from the shale, migrates until it finds a porous formation which serves as a reservoir and as oil is lighter than water, the water naturally settles in the lowest point and the oil floats on top of it, hence, the most likely place for us to look for oil is on the side of a structure or an anticline as the water will naturally be found in the syncline at the foot of the anticline and the oil floating above it on the side of the anticline.

Inasmuch as there is an impervious "Cap" rock usually found between the Devonian shale and the Devonian limestone, the above theory has been questioned by some oil men because of their contention that the oil could not get from the shale to the Devonian limestone without passing through the "Cap" rock and they contend that this would be almost impossible. The logical answer to this is that on account of the great amount of faulting throughout sections where oil structure exists that this permits the oil to migrate through the cracks and breaks of the "Cap" rock caused by such faulting. It is also possible, as personal experience has proven, to find areas in and near oil fields where the "Cap" rock is either missing entirely or has disappeared, and as oil migrates a great distance, it is easy for it to enter the sands at such places where movement of the waters and gravity would do the rest.

In the sections of Kentucky, located on top of and close along the sides of the great Cincinnati arch, except where the Ordovician is exposed as the surface rock or where the Devonian shale is outcropping, the shale offers the proper formation for the supply of oil, and thus having the correct formation, it is only necessary to look for the proper structure favorable for the accumulation of oil. This favorable structure consists of anticlines, folds, domes and faults. In the neighborhood of the Cincinnati Arch there are many of these to be found, thereby assuring the scientific oil operator that he has all conditions favorable for oil when once they are located.

In the Irvine and Scottsville pools the formation acting as a reservoir for the oil is found just below the black shale, and consists of a dolomitic limestone and I desire to suggest the possibilities of the salt water absorbing or cutting away the magnesia in this formation, thus accounting for its porosity. This formation is known as the Corniferous limestone. In some localities oil is found in a limestone of the Waverly formation lying above the Chattanooga shale.

### Waverly Formation.

Immediately above the Devonian formation lies the Lower Carboniferous, which has an average thickness of about 350 feet, the lowermost section of which is the Waverly shale. At its base it is a light blue clay shale, passing upward into a sandy shale and an argillaceous sandstone. Near the base the shale abounds with light blue or drab iron concretions which are easily distinguished by their dark color and extreme toughness while the upper portion of this formation is equally distinguishable by siliceous concretions.

Still a part of the lower carboniferous, but lying considerably above the Waverly formation is the "Newman" limestone and in the type locality it is nearly 1,500 feet thick although in places it is found less than one-tenth of this thickness. Successively above the Newman limestone as you go back from the Cincinnati Arch toward the coal measures are found the Pennington shale, the top of the Lower Carboniferous series. On top of this is found the Upper Carboniferous or the Lower Pottsville represented by the Lee formation, the Rockcastle Conglomerate Lentic and the Corbin Conglomerate Lentic and as we go still further eastward we find the younger formations lying still on top of these.

Over most of the area lying on top of the Cincinnati Arch (except on the Jessamine and Nashville Domes) the surface or country rock is the Waverly formation which ranges from 100 to 300 feet in thickness and therefore, it will be seen that in operating for oil in this section the drilling will be shallow, inasmuch as the operator only has to drill through the Waverly formation and the Devonian into the oil reservoir. Good wells have been obtained at a depth of 85 feet while possibly the average well, starting in the Waverly formation, will not exceed from 350 to 400 feet, although it is necessary to drill, where starting back on the Newman limestone, to from 600 to 1,000 feet or more.

A vast area covering the southern half of the state and nearly 100 miles wide consists of the Waverly as the surface rock and in this area, many small structures, faults and so forth are to be found even though it lies on top of the Cincinnati Arch, and many oil pools will be developed when the country is examined, geologically, from a scientific standpoint.

### Other "Oil Sands."

Below the "Corniferous" in the Silurian formation is found a porous lime-

stone which frequently is saturated with oil and is known as the "Clinton," and still below this in the Ordovician system is another limestone which is also often porous and found saturated with oil. This is known as the "Trenton." All of these except the Trenton, and even it in some places, are missing on both the Jessamine and Nashville Domes because the rocks of these domes are Ordovician and only the Trenton would be possible in this formation. The "St. Peter" or "Calcareous" is still below the Trenton and there are possibilities that it may be found saturated with oil in places. If one were to drill for the Clinton or the "Corniferous" on these domes he would have to drill up in the air, if possible, because their proper position, if present at all, would be several hundred feet above the rocks upon which one is standing when on top of the dome at Lexington.

### The "Cincinnati Arch"

The major axis of the Cincinnati Geantline probably follows the Cumberland River in its trend northward from the Nashville Dome until it reaches Pulaski County where there seems to have been a break. This is evidenced by the exposure of the Ordovician system along the Cumberland River. In its trend southward from the Jessamine Dome it probably follows the head waters of Green River to a point about where Casey's Creek empties into Green River. This is evidenced by the Devonian Black Shale appearing as the surface rock along this course.

At Mansville, in Taylor county, another exposure of the Devonian Black Shale is found; its course lies also northeast and southwest and in looking at a geological map it will be perceived that both of these seem to indicate that they trend directly towards the black shale exposure on the Barren river on the northeastern boundary of Allen County and also to the black shale exposure at Petroleum in Allen County. Midway between these there is an exposure of black shale near Gradyville in Adair County, which is not shown on the large geological map of Kentucky, and this would seem to prove the continuity of some uplifted condition along this line which is evidently a minor fold or axis on the top of the arch. Near the corner of Green, Taylor and Adair counties, and practically directly on this line, the Morrison Development Company have drilled several wells which proved to be gas wells and as gas is usually found at the top of the arch it seems to strengthen this theory.

The southern trend seems to overlap or parallel the northern one at a point several miles distant from it unless it is a second of minor axis. Between these two supposed axes, notably at Breeding and near Picnic, in Adair county, there are minor folds which seem to give a very undulating top to this broad arch, even though slightly dipping to the west, and on account of the shallowness of the Devonian, this forms an ideal section for shallow drilling.

### The Top and Western Side.

As we go west from the Cumberland River through Monroe, Cumberland, Russell, Adair, Green, Taylor, Metcalfe, Barren, Allen, Logan, Warren, Hart and La Rue counties, we are traveling over a monoclinical area, where the principal surface rock is the Mississippian and where drilling should also be very shallow. As we go west, away from the axis of the Cincinnati Arch we find the rocks dipping northwest so that in the western part of Warren county we will have to drill much deeper to reach the "Corniferous" than we will in Cumberland county. Some geologists claim that in a portion of this section of Kentucky the "Corniferous" is missing, but if this be so other porous formations act as oil reservoirs in its absence.

As a proof that the Cumberland River is practically the major axis of the Arch, we find the Ordovician system exposed along the Cumberland River and we find the formations dipping away from the river on each side of it. It is true that there has been some erosion at the river but erosion does not cause the formations to dip west on the west side and east on the east side of the river.

On account of the nearness of the "oil sand" to the surface, it can also be predicted that the closer to the Cumberland River the drilling is done the shallower the wells will be, and the farther away from the river, especially on the east side, the deeper the wells will be. Across Adair, Metcalfe, Monroe, Allen and Barren counties, which lie practically on top of the arch and in the saddle formed between the Jessamine and Nashville Domes, the drilling will average between three and four hundred feet. This is true until Logan, West Warren, east Edmonson, east Grayson, Hardin and Bullitt counties are reached, and from these counties the dip of the oil sands into the western Kentucky coal basin becomes more acute and therefore will require considerably deeper drilling. These are the reasons why the south-central counties of Kentucky will prove shallow drilling oil territory.

### Breeding Anticline.

The writer made an examination and a map of the southern portion of Adair county from Crocus Creek to a point west of Breeding, by which it was ascertained that there are other minor folds

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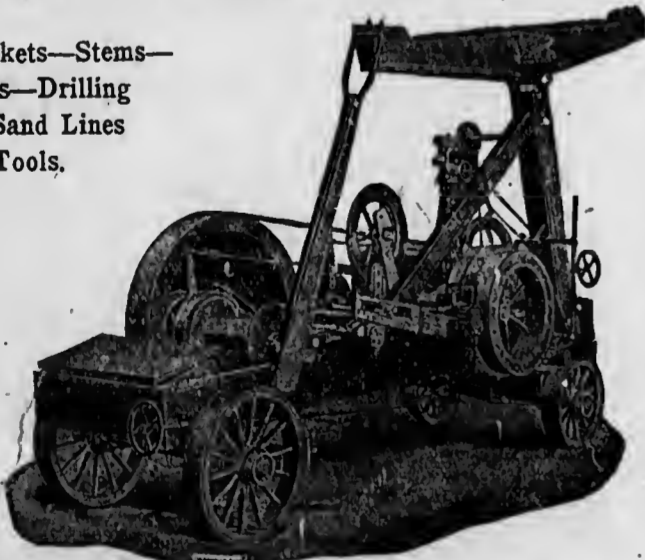
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existing in that section as one travels away from the major axis of the Cincinnati Arch at the Cumberland River. There is a small fold or terrace in the vicinity of Picnic P. O. in Adair county and a larger one is found at Breeding. There is nothing extraordinary about these minor folds being found in this section as it is to be expected that when a disturbance in the bowels of the earth is of sufficient magnitude to cause such an uplift as the Cincinnati Arch, that portions of the sides of this uplift would sink or settle a little, thus forming minor folds or wrinkles on the side of the great arch, and we should not expect to find an arch to be perfectly smooth on its two sides as though it had been carved from marble. It is on these folds that we would expect oil and gas to accumulate.

There are many other minor folds, anticlines, domes and structures in this vicinity which seem to indicate that there are a great many localities where desirable conditions exist for oil to accumulate. There has been but very little drilling done in this section and most of it has been done in places which a geologist would consider unfavorable.

#### The Eastern Side.

In Clinton, Wayne, McCreary and Pulaski counties, on the eastern side of the axis of the Cincinnati Arch, we find a large area where the same Mississippian rock is found to be the surface rock just east of the Cumberland River and the drilling in this section is also shallow. As they proceed east the formations dip very much more abruptly and at a greater degree into the eastern basin than on the western side, and deeper drilling becomes necessary. The oil pools of Wayne and McCreary counties are located on small folds or anticlines on the eastern side of the Cincinnati Arch and are influenced by this great arch.

#### Wells Near Axis of Arch.

There have been many wells drilled along the axis of the Cincinnati Arch and along the Cumberland River. Many of these wells were drilled during the war of the Rebellion and prior thereto by companies searching for salt water, which when found, was pumped into vats and the salt was evaporated from the water. In those days they had no use for oil, nor had they any means of transporting it away from this section. There was also, at a later date, some drilling for oil done in this section, as will be seen by the report in the Tenth Census of the U. S. The report shows that the Matthews well was 262 feet deep and produced a 42 gravity oil. The Glass well was 196 feet deep. The A. G. Ebert well is reported on the map of the 10th Census, published by the Government, as producing 1,800 barrels of oil daily, while the English well, at 191 feet, flowed 1,200 barrels daily. The same authority also credits the great American well with yielding oil for over 30 years and flowing 50,000 barrels before being fitted up with tools and put on the pump. They also credit the Strange well, on Rensick Creek, with producing a light colored oil, and say of the Phelps well that it was but 117 feet deep and a great producer of 28 deg. gravity oil; so therefore, these wells along the axis of the Cincinnati Arch seem to have found the oil at depths ranging from 117 to 276 feet.

**Report Published by Government.**  
In the 10th Census of the P. S., published in 1880, and on pages 24 and 25, we find the following which is very appropriate at this time:

"The oil and burning springs that mark the line from Blue Rock, in Ohio, to the Tug fork of the Sandy River, in West Virginia, is continued in out crops on Paint creek, Johnson County, Kentucky. This creek is a tributary of the west fork of the Big Sandy, and has been described by J. P. Lesley in his report published in 1865. (h) Springs are also met with near Salsersville, in Magoffin County. In Lincoln, Rockcastle, Pulaski, Casey, Green, Adair, Russell and Metcalfe counties oil-springs are found, and oil wells have been drilled at different times. Some of these wells in Lincoln and Casey counties are old salt-wells, drilled fifty or sixty years ago, others are oil wells drilled during the excitement of 1875 and 1878. The oil sand in Lincoln County lies at a depth of about 300 feet. A number of wells have been drilled in this county in the neighborhood of Stanford, all of which are reported to have reached oil, but the wells have not been piped or pumped and none of the oil has been put upon the market. In Wayne county the oldest well in the country is still flowing oil. It was drilled for brine on the little south fork of the Cumberland River, in the southwest corner of the county, in 1818. The oil is heavy black lubricating oil. Wells have been drilled near Monticello since 1865 that yield a heavy oil of a dark green color, specific gravity 25 degrees Baume, that has a high reputation as a lubricator. In Clinton county, oil was obtained in 1866; in Cumberland county the old American well was bored for brine in 1829 and flowed oil till 1860; and in 1865 a large number of wells were drilled along the Cumberland River and the creeks flowing into it, and they probably gave the most certain and largest yield of oil that has ever been ob-

tained for the same cost in any locality. At the same time, probably a larger proportion of the oil produced was wasted than has been the case anywhere else in the United States, as it is supposed that 50,000 barrels from the American well ran down the Cumberland river before any attempt was made to save it. The oil near Burkesville, Cumberland County, has a peculiar, offensive odor and a specific gravity of 37 degs. Baume. Amber oil of a lower specific gravity was obtained from other wells in small quantity, and a large amount was yielded by wells on Oil fork of Bear creek (east of Burkesville), which was of a black color, with a specific gravity of 26 deg. Baume. The oil here appears to be in a sort of marble at 90, 190 and 380 feet from the surface."

"On Boyd's creek, near Glasgow, Barren county, Kentucky, oil has been obtained for several years in commercial quantities, the wells being in the bed of the creek and on the adjoining hills. A few thousand barrels per year are obtained here. Wells have also reached oil on Beaver creek north of Glasgow. A well is also reported to have yielded 'considerable quantities' of oil near Bowling Green, Warren county, and another near the Mammoth cave, in Edmonson county. (See Map V.)"

"Directly north of these counties, on the Ohio river, wells have reached oil at Brandenburg, in Meade county, at a depth of 900 feet; but those who drilled them afterward concluded that they were not deep enough. Three wells were also drilled near Cloverport, which yielded a small quantity of oil. Another well is reported in Bourbon county, and still another at Henderson, in Henderson county. This latter well is reported to have yielded a very valuable lubricating oil. Over at least one-third of the state scattering wells have yielded petroleum, some of which have been among the most remarkable in the country."

We append herewith an exact enlargement of a map found at page 25 in this book which is now long out of print. The map is an exact reproduction (with the exception of a certain boundary marked out on it within which the writer owns a large number of leases. This boundary, of course, has been added to the original map, and therefore we cannot say that it is exact, but it is exact with that exception. When considering this map it must be understood that it is the product of the U. S. Government and not prepared for any special interest, with the exceptions noted.

#### Probable Location of Pools.

This map forms an interesting study to the geologist for it shows a large number of solid dots representing seepages all along both sides of the Cumberland River. These seepages practically show us the position of oil near the axis of the arch.

Some very prolific oil wells were drilled in this section and if the map is carefully examined with the idea in mind that the Cumberland River represents the major axis of the Cincinnati Arch and that travelling towards the head of Crocus Creek would be travelling down the arch from its axis, and then take into consideration the several wells located on Crocus Creek, Herrod's Fork, and Casey's Fork, we will then begin to perceive that if they found such prolific wells in relatively the same position on the side of the arch or monocline all along the northwestern side of Cumberland River for geologic conditions should be relatively the same in other sections as related to the axis of the arch, as on Crocus Creek and therefore the writer predicts that oil will probably be found over a large portion of Russell, southern Adair, Cumberland, Monroe and Metcalfe counties, Kentucky, on the west side of the axis of the Cincinnati Arch and in Lincoln and Cumberland Counties, Kentucky, on the eastern side of the arch. With the exceptions noted this section is practically undeveloped.

#### Chestnut Ridge Anticline.

The Chestnut Ridge anticline which is also a great factor in the oil accumulation in Kentucky, is first noticed in Pennsylvania. It trends southeast through West Virginia as a very pronounced structure and considerable oil and gas development has been done in sections where the accumulation of oil has been influenced by this structure, both in West Virginia and Kentucky. It enters Kentucky at a point about Warfield and travels thence westward to a point near the intersection of Johnson, Morgan and Magoffin counties, where it forms what is known as the Paint Creek Dome. From this point the disturbance is noticed travelling west in the neighborhood of Cannel City, Hazel Green, Campton and near the line between Powell and Estill counties. In eastern Kentucky this disturbance is known as the Conglomerate uplift, in other sections of Kentucky it is known as the Rough Creek Fault, Hough Creek Uplift, etc., etc.

At a point northeast of Irvine and Furnace in Estill County this uplift is broken and forms a fault which was discovered by Dr. Miller some years ago.

It is the opinion of the writer that this fault is caused by the conjunction of the Chestnut Ridge disturbance and

the Cincinnati Arch. It is believed that the Cincinnati Arch was uplifted in very early times and the earth was stretched or bent upward as much as it would stand and that the Chestnut Ridge disturbance occurred at a later period. As it crossed Kentucky at practically right angles to the Cincinnati Arch, it met this bent up and stretched condition where it crossed the Cincinnati Arch and since the earth was not elastic enough to stretch any further, it cracked, one side falling down, supporting the other side at a higher elevation, thus causing the great fault. This faulting condition exists all the way across the top of the arch, but it is not noticed as we have the arch, for it again becomes a large anticline and travels westward through the State to a point about Union County, crossing into southern Illinois and continuing on to the Ozark uplift in Missouri. The exposure of Mississippian in Union, Johnson, Pope and Hardin counties in southern Illinois indicate its position.

#### Other Anticlines, etc.

In addition to these two great disturbances there have been many minor disturbances which have caused small folds and faults. There is a fold running north to the Ohio River from about the location of the Paint Creek Dome in Johnson County. There is a minor fold that runs northwest from this towards the Ragland oil pool. There is an anticline known as D'Inville's which runs southwest through Pike County towards the great Pine Mountain fault and the latter is found extending from Pike County through Letcher, Harlan, and Bell into Tennessee. There is another anticline extending in an east-west direction from Stephensport in Breckenridge and Meade County towards the town of Muldraugh. The Breckenridge anticline commences in the neighborhood of Holt in Breckenridge County and runs southwesterly through Breckenridge County towards a point below Big Spring. South of this there are several minor folds. In Hopkins, Caldwell and Lyons Counties there is a series of faults running for quite a distance from the Mississippi Embayment north-east towards the supposed western continuation of the Chestnut Ridge Anticline. These faults would seem to preclude the accumulation of oil in their immediate neighborhood, but, at the same time would seem to create an ideal condition for the accumulation of oil and gas in Trigg, Christian and Todd Counties which, lying on the side of the western monocline of the Cincinnati Arch, would be influenced by these faulted conditions especially if there is minor structure in the vicinity.

There is a pronounced anticline in Warren and Logan Counties running practically parallel to the axis of the Cincinnati Arch and oil has been found in Warren County in sections influenced by this anticline which, we understand, was discovered by Dr. Hoeing.

#### The Jessamine Dome.

The "Jessamine Dome," properly speaking, is that section of Jessamine, Woodford, Fayette and Bourbon Counties where the old Mohawkian off the Ordovician system is exposed, but to avoid confusing the layman we propose, for the sake of brevity, to classify as the Jessamine Dome all of that section where both the Mohawkian and Cincinnati are exposed. The part where the Cincinnati is exposed is in reality the base of the dome and is not usually referred to as the dome, while the Mohawkian is considered the top or the real dome.

On what we intend to classify (as above mentioned) as the Jessamine Dome and which is represented on the Geological map of Kentucky by the pink colour with a western boundary in Oldham, Jefferson, Bullitt and Nelson, southern boundary in Marion, Boyle, Lincoln, Garrard and Madison and eastern boundary in Clark, Montgomery, Bath, Fleming and Mason, there does not seem to be much possibility of large oil pools being found as the Trenton Sand is either missing or is so near the surface that it does not offer favorable conditions. In support of this conclusion it might be well to say that the writer has a record of three wells drilled near the Henry and Oldham County line, one of which was 1,400 feet, another 1,200 feet, and another 1,500 feet deep. A well was drilled in

Shelby County to 225 feet, one in Boyle to 650 feet, one in Marion to 1,307 feet, one near Bowen in Lincoln County to 1,200 feet, one near Brassfield in Madison County to 1,700 feet, one in Estill County near Powell County line to over a thousand feet, one just north in Powell County to 1,303 feet, one in Franklin County to 1,300 feet, one in Scott County to 700 feet, one in Fayette County to 875 feet, one in Harrison County to 1,300 feet, one in Fleming County to 600 feet, two in Campbell County, one to 1,300 feet and one to 1,100 feet.

In records of the above wells no mention has been made of an oil sand being found, although from time to time small deposits of oil and gas have been reported. Where oil was found it might possibly have resulted from chemical action along the lines of the Carbide Theory, although there is not much support of this theory among Geologists. It seems to the writer that there is a probability that when the great internal pressure was applied which uplifted the Cincinnati Arch that beneath the Jessamine and Nashville domes it was of such force as to so tightly compress the rock then existing at those points that it left no porosity in them, and while the Ordovician does produce oil in several other localities, the pressure exerted from below under the Jessamine and Nashville domes altered conditions here to a great extent.

On the Jessamine Dome the Devonian Black Shale and other younger formations are believed to have been deposited, and if they were, they have certainly been eroded away. The Devonian Shale was deposited and is today found in its proper position over almost the entire state except on the Jessamine Dome and along the Cumberland River, and we may look for oil in all sections of Kentucky which is underlain by the Black Shale but very naturally there will be synclines in which the water has settled. We should search to find the oil on the structures, anticlines and domes. These structures exist all over the west, south and east of Kentucky and the writer feels safe in saying that the oil development in Kentucky is but in its infancy and that many other prolific pools will be discovered as development progresses, especially along the trend of the Chestnut Ridge disturbance and along the sides of the Cincinnati Geanticline, commonly known as the "Cincinnati Arch."

As a final suggestion let it be said that, on account of the many wrinkles, folds and faults existing in Kentucky, no well should be drilled, except as an offset to production, unless it has been located by a competent geologist, because every anticline has two sides and two synclines and as a general proposition "dry holes" will be the reward of drilling in the syncline. While this article has tried to point out the general structures it is important to say that the minor folds on the side of the great structures must be located if success in finding oil pools is attained. We particularly would suggest the possibility of oil at shallow depths in Cumberland, Monroe, Metcalfe, Adair, Russell, Green, Taylor, Casey, Barren, La Rue and Hardin Counties and at greater depths in the counties east and west of these along the structures mentioned herein.

#### WATER A SERIOUS PROBLEM CONFRONTING

(Continued from Page Four)  
the election of Deering J. Marshall, independent operator, as president; V. W. Hoeing, Carter Oil Company, vice president; R. A. Speer, Gypsy Oil Company, secretary, and R. A. Griffith, Sinclair Oil & Gas Company, treasurer.

The meeting in the afternoon did not have as many persons present, but all there were those strictly concerned in the business of the meeting, and more companies were represented in the afternoon than on the previous evening. The meeting adjourned, after which the officers had another meeting at which I was especially asked to remain. At this meeting, provision was made and gone over, which would be submitted in writing to the various companies for ratification. The name of the association adopted was "Kansas Oil & Gas Association," the idea being that sooner or later they would wish to extend their

work into other fields of Kansas.

I feel that a good start has really been made, and I was very much pleased to see that the larger companies sent their high officials, even from Tulsa, and I was also pleased with the immediate action they took on the whole proposition. As I anticipated, the association will not be willing to go as far as they will find necessary, but I think this is all right because they will have to build up an effective association by evolution, and if too much is tried at the start the members would not accept it. It is only after they have had the experience and see the necessity for certain measures which they consider as stringent now that there is any hopes to put such measures into effect. My whole attitude on this association has been that the principal thing is the psychology, and that until the operators are in the mood and unless they are kept in the mood, the thing would fail. Personally, I anticipate that in the course of a year or two the whole thing will be put up into state laws, as the most earnest producers will find about that time that only through authority can it be put into effect at all. Possibly it may work out better than I anticipate. I can not help but feel that no matter what the results of the association—whether it becomes permanent and effective or not—that much good has been accomplished, because it has got the oil men thinking on this water problem in this field and a great deal of educational work will be done. I was very much pleased at the attitude of the oil men, and they were surprised themselves to find what the prevailing sentiment among themselves was.

One thing that was very apparent in the whole meeting was the cordial feelings towards the Bureau of Mines, and that there is a general sentiment among the producers, not always apparent on the surface, that the Bureau of Mines is playing square and trying to do its best for the industry, and that in the Bureau of Mines the oil men have a friend. I was very particular to state at the meeting that there was absolutely no compulsion being exerted by the bureau, and also to preserve our impartiality. I very carefully avoided assuming any obligation or putting ourselves into

a position where there would be any semblance of compulsion, as I am convinced more and more that the strongest hold of the bureau is its fairness and impartiality, and that except for the co-operative work at Muskogee it asserts no compulsion. At the same time, I made it very strong that the bureau would follow the association with interest and would do as much as it could to help it along. I have left Curtin at Wichita to help out in geologic work, and also as evidence that the Bureau of Mines is still around and has not dropped interest in the association.

Very truly yours,

(Signed) J. O. LEWIS.

#### MANUFACTURE GAS FROM PRAIRIE STRAW

Prof. R. D. McLaurin, of the University of Saskatchewan, Canada, has devised a process for manufacturing gas from prairie straw, with which a motor car has recently been operated. A khaki bag holding 300 cubic feet of gas was carried on top of the car and contained, it is said, enough motive power to drive an ordinary automobile a distance of fifteen miles. According to estimates, a ton of straw will furnish 12,000 cubic feet of gas, which is equal to 35 to 40 gallons of gasoline. This means that each ton of straw will be worth from \$17 to \$19.

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